

REMARKS

Background

The present invention is directed toward the production of sputter targets having the required resistivity so that they may be used to sputter coat heated layers for inkjet print applications. In order to obtain the desired resistivity, a combination of Si-N-W is desired. The development of sputter targets needed for the process presented a challenge to make a solid blend of this combination in the form of a solid sputter target while not creating massive, undesirable particle counts upon sputtering.

It was difficult to blend the W metal powder and Si_3N_4 powder due to the large density difference between these materials. W metal has a high density of 19.3 g/cm^3 while Si_3N_4 has a low density of 3.2 gm/cm^3 . If one were to try to simply blend these materials, the W metal powder would gravimetrically separate before the blend could be loaded into a vacuum hot press or the like.

MgO, as used in the claimed method, is hygroscopic and forms a pasty blend, binding the light Si_3N_4 and heavy W metal particles together in an agglomerated mass. (See paragraphs [0012], [0016]-[0018], and [0023]-[0024]). This agglomeration is then screened to result in the desired particle size. The agglomerated particles are then pressure consolidated into a near net shape for sputter target end use.

The use then of MgO allows the other components (W metal and Si_3N_4) to stay mixed while its presence, in small quantities, does not adversely affect the desired properties of the films formed during sputtering.

New Claim 21

Independent claim 21 has been entered to better define the invention and to distinguish the claims from the art of record. Support for this claim is abundant in the specification with particular note made of the Abstract, and paragraphs [0012], [0016]-[0018], and [0023]-[0024].

Other Claims

Minor amendments have been made in several of the other claims so that they are consistent with new independent claim 21.

Claim Rejections

1. Yoshimura '162 / Miyanaga et al. '917

Attached are Declarations Under 37 CFR §1.131 of inventors Francis S. Valent and Michael J. Regan which confirm and ratify the Declaration of record of inventor Dr. David B. Smathers. Accordingly, the facts of record antedate the effective date of the primary '162 reference.

2. JP'877 and Komatsu '374

The JP '877 patent does not teach or suggest a method of making a sputter target that is useful to sputter a heater layer for an inkjet printer as herein claimed. Further, this reference does not disclose the blending of W metal powder with silicon nitride, and it does not teach use of MgO as set forth in all of the claims.

As is now set forth in the instant claims, the MgO/W metal particles and Si₃N₄ mix provides an agglomerated blend (due to the hygroscopicity of the MgO). After review of this reference, the artisan would not be directed toward the use of MgO in a Ti/Si₃N₄ blend because the density of Ti (i.e., 4.549/cm³) is much closer to the Si₃N₄ density, so the problem of blend stratification would not be faced in JP '877.

Komatsu '374 is also deficient in that it too is not directed to production of a sputter target that is to be used for sputtering a heater layer. Furthermore, this reference does not teach blending of W metal powder as herein recited as the '374 disclosure since the reference is directed to the inclusion of "... oxides, carbides, nitrides, silicides, and borides of Ti, Zr, V, Nb, Ta, Cr, Mo, and W." (See column 2, lines 49-62).

The '374 disclosure is also devoid of any teaching or suggestion of the formation of an agglomerated blend as set forth in claim 20, since the MgO, in the '374, is present in order to

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promote "a function of the . . . rare earth" and to control crystal structure of the sintered body.
(See column 8, lines 1-15).

For all of the above reasons, it is respectfully submitted that the claims define patentable subject matter. The issuance of a Notice of Allowance is solicited.

The Examiner is invited to contact the undersigned attorney if, during the course of reconsideration of this application, any question or comment should arise.

Respectfully submitted,

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